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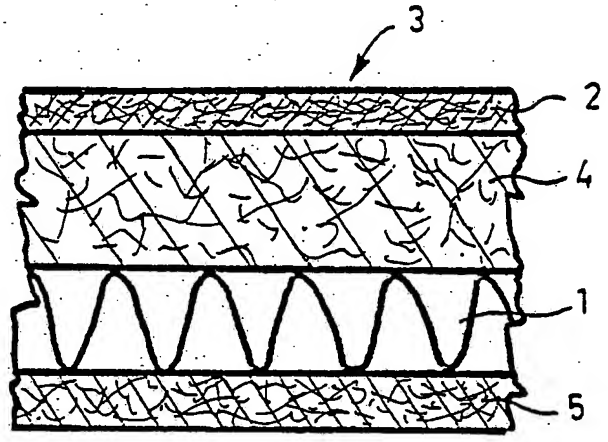
(54) Papermakers felt leaving a smooth surface

(57) A papermakers felt comprises a load-bearing basic structure (1) and a layer arranged thereon and forming a surface (3). In order to improve the operating properties of the felt and in order to make the felt more versatile, the contact area of the surface (3) is more than 10%. The average pore size of the layer (2) forming the surface (3) is substantially within the range from 80 to 0 μm. The layer (2) can be formed of a sliver material having a degree of coarseness of substantially 3 dtex and of an additive added thereto.



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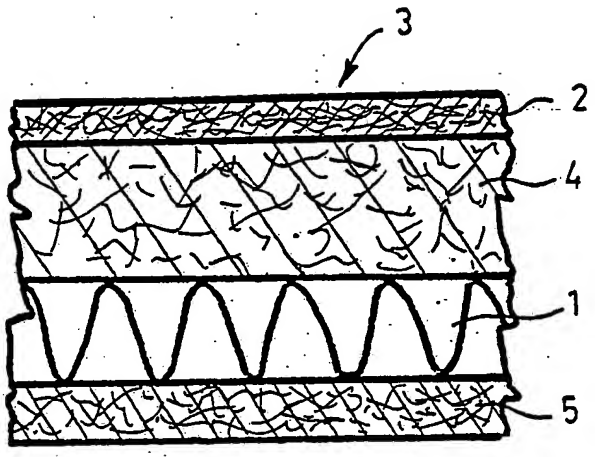

A process band

The invention relates to a process band particularly for the dewatering or transfer of a web, comprising a load-bearing basic structure and a layer arranged on said basic structure and forming a surface making contact with the web.

Process bands of this type are today well-known in the paper industries. Process bands are used e.g. as conventional press felts when removing water from a web by pressing.

Process bands have been manufactured in various embodiments. Press felts alone are commercially available in many types and variations.

A drawback of prior felts has been that their dewatering properties are not the best possible. A further drawback is the excessive coarseness of the felt surface, so that the smoothness of the web is inferior after the pressing step. These drawbacks are due to, e.g., the fact that the contact areas of the felts, i.e. felt surfaces making contact with a web, are too small. The contact areas of felts in use today are less than 10%. In addition, the pore size of prior felts and that of the surfaces thereof in particular is relatively large. The pore size of prior felts varies from 50 to 200 μm throughout the felt. The average pore size of prior felts, in turn, varies from about 100 to 150 μm.

The object of the invention is to provide a process band by means of which the drawbacks of prior solutions can be eliminated. This is achieved by means of a process band according to the invention which is characterized in that the contact area of the surface making contact with the web is more than 10%, and that the average pore size of the layer forming the surface

in contact with the web varies substantially within the range from 80 to 0 μm.

When used as a conventional press felt, the process band according to the invention provides a high dry content due to its large contact area, for instance. Furthermore, the process band according to the invention provides the paper with good smoothness both when used as a conventional press felt and as a mere transfer felt. By virtue of the large contact area thereof, the process band according to the invention is very suitable for use as a transfer felt because a web adheres firmly to the felt. The adhesion of the web to the felt may be adjusted in an advantageous manner according to the requirements of each particular case. By virtue of the small pore size of the surface of the process band, no rewetting occurs even though the web may make contact with the felt even for a longer period of time when the felt is used merely for the transfer of the web in the press section.

The invention will be described in more detail in the following by means of a preferred embodiment of the invention shown in the attached drawing, wherein the figure is a general cross-sectional view of a process band according to the invention.

The example of the figure shows a structural solution for a process band when the process band is used as a conventional press felt, that is, as a felt which participates in the dewatering by receiving water from the web in the press section. The principle and realizations of the dewatering of a web are obvious for one skilled in the art, so these matters will not be discussed more closely here.

In the example of the figure, the reference numeral 1 indicates a basic structure of a press felt,

that is, a basic fabric forming the load-bearing structure of the felt. A layer forming a surface which makes contact with the web is indicated with the reference numeral 2 in the figure. The surface making contact with the web, in turn, is indicated with the reference numeral 3. In the example of the figure, another layer 4 is provided below the layer 2. The layer 2 is formed of a sliver material having a low degree of coarseness, i.e. below 6 dtex, and the layer 4, in turn, of a sliver material having a degree of coarseness of substantially about 15 dtex. In the example of the figure, the reference numeral 5 further indicates a conventional sliver layer positioned on the reverse side.

According to the invention, the contact area of the surface 3 making contact with the web is over 10%. The average pore size of the layer 2 forming the surface 3 in contact with the web varies substantially within the range from 80 to 0 μm. In the example of the figure, the thickness of the layer forming the surface 3 in contact with the web is about 0.5 mm.

Since the coarseness of the sliver material in the surface of the felt is about 3 dtex, the pore size of the raw felt is already as small as possible and the contact surface as large as possible. Further, the contact surface is increased and the pore size is decreased by means of an additive added to the sliver material. The pore size of the layer 4, too, may be decreased by means of an additive.

The starting point in the example of the figure is thus a raw felt manufactured by a conventional needling method. The contact surface and the porosity can be affected already at the raw felt stage by the use of sliver materials having different degrees of coarseness, different kinds of sliver layers, and dif-

ferent fabric types in the basic structure. By varying the thickness of the layer 2, it is also possible to adjust the properties of a finished felt. Thus, in an extreme case, the layer 2 forming the surface of the felt may extend through the felt. This kind of embodiment is to be preferred especially in cases where the felt is used merely for the transfer of a web.

In addition, the properties of the felt can be adjusted by means of various additives. As used herein the term additive refers to all substances introduced into the felt during or after the manufacture of a conventional felt for increasing the contact surface of the felt and for decreasing the pore size. Such substances include fibres which are added to the sliver material during the manufacture and which have a lower melting point than fibres contained in the proper sliver, so that the added fibres melt at the finishing stage of the felt. These additives also include rubbers, polyurethanes, other plastic materials, etc., which are capable of increasing the contact surface and decreasing the pore size. Further, these additives include various chemicals which increase the contact surface and decrease the pore size.

It is not, either, necessary to form the layer 2 forming the surface in contact with the web of a layer of sliver material and an additive; instead, the layer can be formed by providing a layer of an additive, such as plastic or any of the above-mentioned additives, on the basic structure 1.

The above embodiments are by no means intended to restrict the invention, but the invention can be modified within the claims in various ways. Accordingly, it is obvious that the average pore size, for instance, can be varied as desired according to the

requirements in each particular case. As a conventional press felt, the pore size of the band may be e.g. at least 80 to 60 μm, whereas in more demanding applications the value may vary from 60 to 20 μm. When used for the purpose of transferring a web, the average pore size may be e.g. at least 60 to 40 μm; however, depending on the requirements of each particular application, the pore size may be even 40 to 0 μm. If the pore size has been decreased throughout the felt, the pore size thereof is thereby below 100 μm in average. As a conventional press felt, the average pore size of the entire felt is 100 to 40 μm, and as a transfer felt 60 to 0 μm. The contact area mentioned in the text above was measured with a FOGRA surface smoothness meter (FOGRA-KAM value %) at a pressing pressure of 2.5 MPa. The values of the pore size, in turn, were obtained with a mercurial porometer.

The invention is not, either, restricted with respect to the method by means of which the additive is introduced into the felt. The additive may be introduced into the felt together with the sliver material of the felt; it may be applied with a roll; or it may be introduced by spraying in liquid form, by foaming, by laminating, etc. The contact surface of the process band according to the invention can also be increased as desired by means of mechanical methods. The surface can be increased e.g. by calendering, grinding, etc. As mentioned above, the invention is not restricted to a solution utilizing a conventional fabric or needling technique, but the process band can be of any kind. The solution according to the figure can, of course, also be modified by omitting the layer 4 or, alternatively, by providing a plurality of layers in place of one layer 4. If the

layer forming the surface in contact with the web is formed directly on the basic structure, it is clear that the layer can be formed by any method and of any one of the above-mentioned additives or mixtures thereof.

Claims:

1. A process band particularly for the dewatering or transfer of a web, comprising a load-bearing basic structure (1) and a layer (2) arranged on said basic structure and forming a surface (3) making contact with the web, c h a r a c t e r i z e d in that the contact area of the surface (3) making contact with the web is more than 10%, and that the average pore size of the layer (2) forming the surface (3) in contact with the web varies substantially within the range from 80 to 0 µm.

2. A process band according to claim 1, c h a r a c t e r i z e d in that the thickness of the layer (2) forming the surface (3) in contact with the web is about 0.5 mm.

3. A process band according to claim 1, c h a r a c t e r i z e d in that the layer (2) forming the surface (3) in contact with the web extends through the process band.

4. A process band according to claim 1, 2 or 3, c h a r a c t e r i z e d in that the layer (2) forming the surface (3) in contact with the web is formed of a sliver material having a low degree of coarseness and of an additive added thereto.

5. A process band according to claim 1, 2 or 3, c h a r a c t e r i z e d in that the layer (2) forming the surface (3) in contact with the web is formed of an additive layer arranged on the basic structure (1).

6. A process band according to claim 4 or 5, c h a r a c t e r i z e d in that the additive contains plastic material.

7. A process band according to claim 4 or 5, c h a r a c t e r i z e d in that the additive con-

tains rubber material.

8. A process band according to claim 4, c h a r a c t e r i z e d in that the additive contains fibres the melting point of which is lower than that of the fibres contained in the sliver.

9. A process band according to claim 4 or 5, c h a r a c t e r i z e d in that the additive contains chemicals which increase the contact surface and decrease the pore size.